THE AUSTRALASIAN SOCIETY FOR BIOMATERIALS & TISSUE ENGINEERING

ASBTE *NEWS*

MAY 2012

WORLD BIOMATERIALS CONGRESS

In a few days the 9th World Biomaterials Congress will be opened in Chengdu, China. Many ASBTE members will travel to this congress, which brings together Biomaterials Societies from around the world once every 4 years. The final program is now available (www.wbc2012.com).

The Annual General Meeting of the ASBTE will also be held at this meeting. Please note the time for the AGM has changed to: Monday June 4th, 2012: 12:15-13:30, Shuhan Room, 3rd Floor, New Century International Exhibition and Convention Centre, Chengdu, China. You will find the agenda for the AGM at the end of this newsletter.

ASBTE is also a proud sponsor of the following symposia at the World Biomaterials Congress, which are organised by ASBTE members:

Symposium Organiser (Affiliation)	Symposium Title
Dr. Tim Hughes (CSIRO)	Ophthalmic Biomaterials
Prof. Anthony Weiss (University of Sydney)	Elastic Biomaterials
Prof. Dietmar Hutmacher (QUT)	Biomaterials and Tissue Engineering Approaches for Cancer Research
Dr. Jerome Werkmeister (CSIRO)	Design of Reombinant Protein Scaffolds for Tissue Engineering
Dr. Thilak Gunatillake (CSIRO)	Recent Advances in Gene Delivery Systems
Dr. Travis Klein (QUT)	Biomaterial Approaches to Induce Zonal Cartilage Organisation
Dr. Mark Staiger (University of Canterbury)	Biodegradable Metals
Prof. Nico Voelcker (UniSA)	Nanostructured Porous Silicon as a Biomaterial

CSIRO will have a booth at the World Biomaterials Congress and some ASBTE information will be displayed there. For those attending the congress, this will also be a good meeting point!

World Biomaterials Congress meeting Chengdu, China June 1-5 2012

ASBTE Website (www.biomaterials.org.au)
Any member wishing to supply news items, links, PhD scholarships, job listings, or other relevant information to the ***website*** should submit these to Michael Mucalo (m.mucalo@waikato.ac.nz)

New Membership and Renewals: Membership Rates: Full Member (Calendar Year) $60; Student Member (Calendar Year) $30. Membership forms are available at www.biomaterials.org.au

ASBTE NEWS is a biannual newsletter that covers news from The Australasian Society for Biomaterials & Tissue Engineering. If you have a news item that you wish to be included please contact the editors:

Tim Dargaville (t.dargaville@qut.edu.au)
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2012 Travel Grants and ASBTE Annual Conference Travel Awards

ASBTE is pleased to announce the winners of the 2012 Lab Travel Grants and ASBTE Annual Conference Travel Awards.

ASBTE Lab Travel Grants: ASBTE is providing 2 travel grants to facilitate travel to research laboratories during 2012. The decision on the awards was been made by the ASBTE Committee. Congratulations to: Katherina Ladewig (University of Melbourne) and Peter Levett (QUT)!

ASBTE Annual Conference Travel Awards: ASBTE provides conference travel awards to assist postgraduate research students and early-career researchers to attend the 9th World Biomaterials Congress, 1-5 June 2012 in Chengdu, China. The successful applicants will present their work at the Conference. The decision on the awards was made by the ASBTE Committee. Congratulations to:

Adoracion Pegalajar Jurado	Swinburne University
Azlin Fazlina Osman	University of Queensland
Bahman Delalat	Flinders University
Chandhi Goonasekera	University of Queensland
Deepika Nandakumar	University of Sydney
Dorna Esrafilzadeh	University of Wollongong
Eman Nafea	UNSW
Ferry Melchels	QUT
Jay Waterman	University of Canterbury
Jemimah Walker	University of Otago
Jing Zhong Luk	University of Queensland
Kai Chan	University of Otago
Kate Fox	University of Melbourne
Katherina Ladewig	University of Melbourne
Yiwei Wang	ANZAC Medical Research Institute
Martin Sweetman	Flinders University
Norsyahidah Hidzir	University of Queensland
Peter Levett	QUT
Soraya Ghaemi	Flinders University
Stephanie Pace	UniSA
Vijayaganapathy Vaithilingam	CSIRO
Xuan Li	University of Canterbury

Hot Article by ASBTE Member

Toby D. Brown

Hot Article:

T.D. Brown, P.D. Dalton, D.W. Hutmacher, *Direct writing by way of melt electrospinning,* Advanced Materials **23** (2011) 5651-5657.

Can you provide a description of the work presented in the paper?

We developed a melt electrospinning fibre writing process suitable for the fabrication of porous tissue engineering (TE) scaffolds. Melting a polymer, extruding it through a fine needle and applying a high voltage to the emerging polymer creates a jet which is drawn towards a grounded collector (the process looks similar to dripping a viscous fluid such as honey on toast). The jet will coil randomly as nonwoven fibres if it deposits onto a stationary collector. However if the collector is translated laterally at a speed which matches the jet speed, this opens up the opportunity to "write" with a continuous fibrous filament. An automated x-y stage can be used as a collector, translating according to custom programs allowing the generation of layers of parallel fibrous lines which can be stacked on top of each other to create a three-dimensional (3D) construct. Varying the inter-fibre spacing as well as the orientation of consecutive layers of parallel fibres allows precise control over scaffold architecture.

How did this project come about?

I commenced working on this concept during my final year honours thesis project at QUT (Bachelor of Medical Engineering) which evolved by combining melt electrospinning work conducted by Dr. Paul Dalton and fused deposition modelling (FDM) scaffold production technology developed by Prof. Dietmar W. Hutmacher (my PhD supervisors).

Can you describe how this work impacts your field?

Typically solution electrospinning has been researched because it is a simple method to generate submicron diameter polymer fibres attractive for TE scaffolds. However the highly dynamic nature of the jet means control over fibre location and thus ordered scaffold fabrication is technically challenging, essentially limited to two-dimensional constructs. Alternatively, direct writing techniques such as FDM from additive manufacturing technologies allow very defined 3D structures but the filament resolution is limited to around 100 µm. We have bridged the gap between these two scaffold fabrication approaches, where direct writing by way of melt electrospinning enables the production of 3D electrospun scaffolds with precise control over pore geometry and a filament resolution approaching submicron magnitudes.

Where to from here?

For the remainder of my PhD, including an Endeavour fellowship to work in 2012 with Prof. Juergen Groll at the University of Wuerzburg, Germany, I aim to develop a robust fibre printer with a view to improved filament resolution as well as enhancing the productivity of the process.

If you have a recently published an exciting article of interest to ASBTE members please contact the editors of the newsletter - Tim Dargaville (t.dargaville@qut.edu.au) and Helmut Thissen (helmut.thissen@csiro.au).

Student Column

ASBTE Student Networking Nights
November 2011

The ASBTE student representatives took the initiative and hosted a series of events to facilitate student networking within ASBTE and also to get more students involved in the society. Here are some details on these very successful events, which all featured an invited speaker, followed by a student get-together.

Overall the feeling following these events was that this is an excellent way to spread the word about the ASBTE to the student community. The students who attended certainly were enthusiastic about further participation in the society and future events like these.

Adelaide

10 people attended the successful meeting in Adelaide. The speaker was Dr. David Steele - Senior Research Fellow at the Mawson Institute, University of South Australia. David gave a very interesting talk about plasma polymerisation and its applications in tissue engineering, specifically skin, cornea and retina reconstruction.

After the lecture David answered questions and the event continued at the Austral Hotel. Students from different Universities had an opportunity to exchange ideas and everybody really enjoyed the meeting.

Melbourne

19 people attended the talk by Prof. Peter Kingshott from Swinburne University, who recently returned to Australia, about “Surface engineering our way towards better biomaterials”, which was not only very interesting but also entertaining.

Melbourne event

The event continued with drinks after the talk at the Hawthorn Hotel, close to the Swinburne campus. The ASBTE President, Dr. Thilak Gunatillake was also present and impressed by the event. He has indicated that the society would be happy to support similar events again in the future.

Sydney

The Sydney event was also a success. 12 people, ranging from undergrads in Materials Science at UNSW to PhD students from the University of Wollongong, a student from Sydney Uni and even a ring in from Adelaide attended the meeting. Prof. Laura Poole-Warren gave an informal, very entertaining and inspiring talk about her career and all the twists and turns along the way.

The meeting continued at a small pub on the UNSW campus. Everyone who came was interested in the society and will certainly stay connected to the biomaterials community.

Sydney event

Brisbane

The Brisbane event was definitely a success with more than 28 attendees! We first enjoyed a vibrant talk from Dr. Tim Dargaville, an active member of the ABSTE for several years and chemistry lecturer at the Institute of Health and Biomedical Innovation (IHBI) at QUT. Tim presented his inspirational research journey, providing tricks and wise advices to early career researchers, not without a touch of humour, which all attendees greatly enjoyed.

The evening then proceeded in an open air hotel in the city centre of Brisbane for drinks kindly subsidised by ASBTE.

Student Column

(Student column cont from previous page):

Researchers from both UQ and QUT were present and many connections were made over drinks and tacos. Feedback from everyone was very positive and non-members enthusiastically went home with a registration form, keen to be part of the ASBTE.

Overall, attendees really enjoyed the seminar/ drinks format which they thought was excellent for making new connections. Many have indicated that they would appreciate if more of these events would be held in the future.

A BIG THANK YOU to the ASBTE student reps (*Cara, Nathalie, Dori, Agnieszka and Shaylin)* for organising these events!

Please remember that you can find further information on the student page of the ASBTE website:

http://www.biomaterials.org.au

as well as on facebook:

http://www.facebook.com/group.php?gid=338352205119

Brisbane event

As always, please let your student representatives (*Cara, Nathalie, Dori, Agnieszka and Shaylin)* know if you have any suggestions or any news you'd like to share.

Congratulations

Congratulations to Prof. Laura Poole-Warren and Prof. Dietmar Hutmacher, who have recently been elected to Tissue Engineering & Regenerative Medicine International Society (**TERMIS)** Asia-Pacific council positions**.**

Annual ASBTE Conference 2013

Annual ASBTE Conference 2013

In 2013 the Annual ASBTE Conference will be combined with the **5th Indo-Australian Conference on Biomaterials, Implants, Tissue Engineering and Drug Delivery Systems**. The conference will be held in the Barossa Valley, close to Adelaide. At this stage, an organising committee has been formed to finalise the details, for example in regard to the venue. Please note the dates already in your calendar (Tuesday—Friday in the week following Easter):

2nd – 5th April 2013

Barossa Valley, South Australia

Travel Grant Reports

Dr. Bobby Mathan
Discipline of Chemical Engineering, James Cook University, Australia

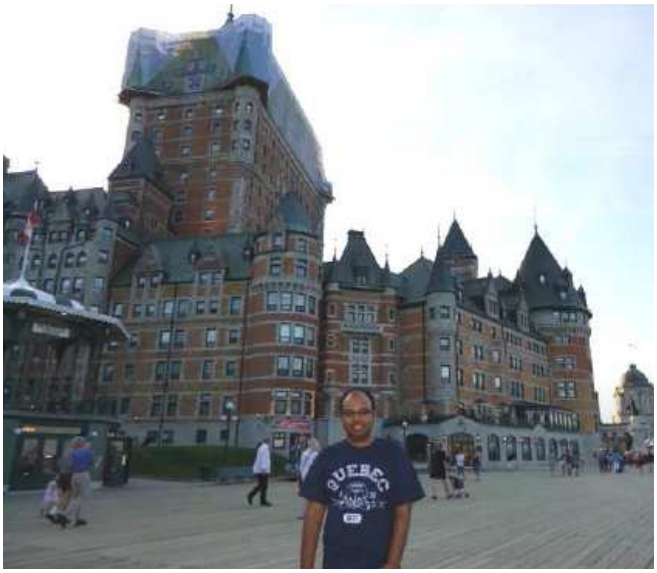
Dr. Mathan received an ASBTE Travel Grant to visit Laval University in August 2011 to collaborate with Prof. Mantovani, Director of Biomaterials and Bioengineering Laboratory, Laval University, Canada, in the area of biodegradable biomaterials.

Biodegradable biomaterials are highly attractive for temporary implant applications. A number of biodegradable polymers are available in the market, but due to their poor mechanical properties they are not suitable for load-bearing orthopaedic applications. Magnesium, a metallic material, is considered as a potential candidate for biodegradable implant applications for various reasons: magnesium degrades in the physiological environment; magnesium is essential to human metabolism the and beneficial for bone strength; and the mechanical properties of magnesium are similar to natural bone. However, one major issue in the application of magnesium in biodegradable implants at present is the high corrosion rate of magnesium in the physiological environment. Therefore the current research focus is geared towards developing new magnesium alloys and also involving surface treatments to improve the corrosion resistance of the material.

Surprisingly, there is no standard methodology to determine the corrosion rate of magnesium-based materials under *in vitro* conditions. Although researchers have used simulated body fluid (SBF) for testing new materials, their experimental set-up did not simulate the physiological conditions e.g. SBF was kept under static condition. Prof Mantovani, a well known biomaterials researcher, and his group members have been working on designing a setup for determining the corrosion rate of biodegradable metallic materials (especially iron-based) under *in vitro* conditions.

Dr. Mathan expressed his interest to visit his lab to get an insight on the *in vitro* testing methodology and the experimental setup. Prof. Mantovani immediately agreed and made the necessary arrangements. The issues related to measuring the corrosion rate of metallic biodegradable biomaterials was discussed during the visit. The visit was very useful and has enabled the fine-tuning of the experimental setup at James Cook University to simulate physiological conditions. Furthermore this visit also provided an opportunity to discuss further collaborative research work in this exciting field with Prof. Mantovani.

Dr. Mathan also took this opportunity to attend the International Conference on Processing and Manufacturing of Advanced Materials & Degradable Metals for Biomedical Applications (3rd Intl. Symposium) in Quebec City. Here he delivered an invited talk entitled "Mechanical Integrity of Resorbable Magnesium-based Biomaterials: A Critical Analysis of Testing Methods". At the conference, he also met many renowned researchers in this area and had fruitful discussions. Dr. Mathan would like to thank ASBTE for funding this trip.



Cara Young
Graduate School of Biomedical Engineering, UNSW

Cara is working in the Biosynthetic Polymer Group in Biomedical Engineering at UNSW. Her project is looking at biosynthetic hydrogels for the microencapsulation of cells. This technique ideally provides immunoisolation to encapsulated therapeutic cells and therefore allows transplantation of allogeneic and even xenogeneic cells for the treatment of diseases such as diabetes. To date most approaches use alginate based systems which have significant disadvantages and most cells lose function and viability over time. One major reason for this is loss of contact with extracellular matrix.

Cara and others in the group are working an poly(vinyl alcohol) based synthetic hydrogels and adding small amounts of biologicals with the aim to impart function and prolong encapsulated cell viability. To date she has designed an electrospray system which combined with UV photopolymerisation can produce microspheres from a photoactive macromer solution. She has produced microspheres using PVA and heparin methacrylate and has shown that these microspheres are capable of supporting significantly higher cell viability than PVA spheres alone using a model fibroblast cell line. For the next step in this project, Cara wanted to incorporate an anti-inflammatory peptide into her microspheres in order to provide additional active immune protection for the encapsulated cells. In order to learn some new chemistry to do this, she recently spent 2 months in the Laboratory of Prof. Kristi Anseth at

(Travel grant report cont from previous page):

the University of Colorado, Boulder, thanks to the support of the ASBTE Lab Travel Grant. There she learnt peptide synthesis and how to incorporate these peptides into gels using thiol-acrylate chemistry. Cara synthesised an anti-inflammatory peptide that binds TNF-α and fluorescently tagged it to be able to visualise and quantify incorporation into the gel network. She also gained more experience encapsulating and characterising the function of a therapeutically relevant cell line, MIN6 beta cells. Furthermore she learnt a technique for creating spherical aggregates of cells which is especially important for MIN6 cells which survive better with cell-cell contact.

Cara was also able to attend the 2011 Society for Biomaterials Conference at Disneyworld in Orlando. It was a great experience to be able to present her work at an international conference and to meet some of the influential people in the field. Cara would like to thank ASBTE for funding her travel, as well as Prof. Kristi Anseth and the rest of the Anseth group for hosting her. She is now using what she has learnt to continue to improve encapsulated cell function and viability.

Agenda - 22nd ASBTE General Meeting

22nd Annual General Meeting of the ASBTE 2012

Agenda

Venue: New Century International Exhibition and Convention Centre, Chengdu, China (Shuhan Room – 3rd Floor)

Date & Time: June 4th, 2012: 12.15 to 1.25 PM

AGENDA

- Minutes from 21st AGM held in Queenstown, New Zealand
- President's Report (Thilak Gunatillake)
- Secretary's Report (Tim Woodfield)
- Treasurer's Report (Penny Martens)
- FASTS Report (Jorge Garcia and Penny Martens)
- Website Update (Michael Mucalo)
- ASBTE International Travel Grants – Update (Nico Voelcker)
- Election of Officers and Committee Members for 2012/13
- Appointment of Other Positions
  - State/OS Representatives
  - Student Representatives
  - Public Officer
  - IUSBSE/ILC Delegates
  - FASTS Liaison Officer
- New Proposals for Discussion/Approval at AGM
- Option for combined ASBTE 2014 Annual Meeting with 4th International Symposium on the Surface and Interface of Biomaterials in Australia.
- International Union of Societies for Biomaterials Science and Engineering (IUSBSE) Report to ASBTE (Laura Poole-Warren and Keith McLean)
- Next AGM